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holdings, more capital invested, and the scientific skill employed that is essential to crop raising as to manufacturing, these figures would show greater and better results. Much idle land—hill-slopes and marshes—that might be filled, would bring up the area that could be profitably cultivated to perhaps more than double the present number of acres; and this is of importance to the people of the United States, for Bermuda furnishes them with fresh vegetables, onions, and potatoes at a time when none are grown there; moreover, these vegetables are of the very best in quality, and come at the most desirable season.

The growing of lily-bulbs—*Lilium longiflorum Harrisii*—to supply the great demand at Easter for floral decorations of churches and houses, is another important industry, needing greater skill and care in its development. These bulbs, in a dormant state, are shipped to America by steamers and sold to the hot-house trade, who plant them under glass, and at the proper time force them, that the flower may be ready at the needed time to meet the great demand at Easter. These flowers, commonly called Easter lilies, seem to be the only lily that can be fully developed at a time when in most demand, and the curtailment of the supply would be matter of great regret to the people of the United States.

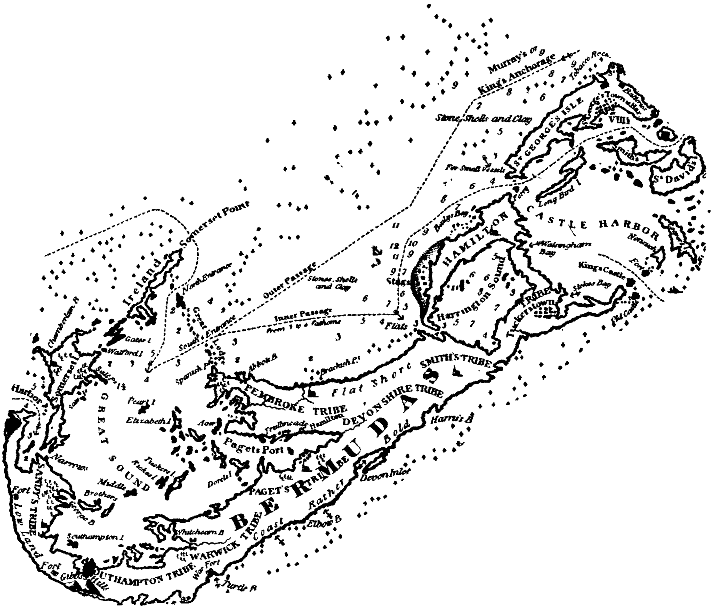
NOTES ON THE BERMUDAS.

BY

CHARLES L. BRISTOL.

The Bermudas are a small group of low-lying islands lying alone in the Atlantic Ocean, about seven hundred miles due east from Savannah, Ga., and nearly the same distance south from Halifax, N. S., or in latitude 31° N., longitude 65° W. The present land area comprises five large islands and many small islets. To the north and east of the land is an area of reefs, which, taken with the land, forms an ellipse whose major axis, which runs N. E. and S. W., is about twenty-five miles in length and whose minor axis is about twelve miles.

The whole ellipse, or Greater Bermuda, as Prof. A. E. Verrill, of Yale University, has recently called it, covers about three hundred square miles, and of this the land takes up about twenty square miles, three-fourths of which lies in the main island. The land area is confined to the southwesterly side of the ellipse, forming a long, narrow strip about thirteen miles long in a straight line, or about twenty miles long following the curve of the ellipse. This strip is seldom two miles wide, and for much of its length is less than a mile wide. On the map it resembles a huge fish-hook, with the shank on the N. E. and the point of the hook on the S. W. There are no harbours available for modern ships on the outer shores of the islands, and there is but one break in the chain of reefs that will admit vessels of any size. This channel, St. George's, at the easterly end of the islands and close to the land, has recently been dredged to admit the largest battleships of the British navy—for Bermuda is one of the three great naval stations of Great Britain along the North American coast.



The principal town and only city is Hamilton, situated near the central part of the group. The approach to this harbour is through the St. George's Channel and along the north shore to the Great Sound lying in the curve of the fish-hook. Thence the vessel proceeds through a narrow channel to her dock. At one point the channel is so narrow that one can easily toss a biscuit to either shore. The city contains about two thousand inhabitants and more than five hundred buildings. It is the seat of the Government and the centre of trade and commerce.

The old capital, St. George's, lies at the extreme northeasterly end of the islands, and dates from the earliest settlements in 1609, and has a population of about one thousand. It is a quaint old place, built as the Spanish towns of the West Indies were built in those days of buccaneers and other hardy men of venture. The streets are narrow and bordered by high walls that make every man's house his castle, but shut off all view save from the second-floor windows.

It has a modest botanical garden that is a gem in its way and worthy of a visit from every tourist. In it, just to the left of the entrance, is a memorial to Sir George Somers, after whom the town is named. At present the business interests of St. George's are dormant. The beautiful and spacious harbour, with ample depth for large steamers, is cut off from the channel by a shallow entrance; but if this obstruction were removed, the old town would probably again waken into its old-time vigour.

The population outside of these two corporations is distributed throughout the islands, which are divided into nine parishes, named: Sandys, Southampton, Warwick, Paget, Pembroke, Devonshire, Smith's, Hamilton, St. George's. The total population is about sixteen thousand, of which about six thousand are whites and ten thousand are coloured. Besides these there are about three thousand one hundred soldiers, sailors, and labourers in the barracks and dockyard.

The whites are nearly all of English descent, a large number of the families carrying their ancestry back to the first or very early comers. The coloured population are descendants of the North American Indians (Pequods largely), who were first used on the plantations as slaves, and of African negroes, who were imported later. They are, as a rule, well built and vigorous, as that word goes in the warm, moist climates.

The industries are entirely agricultural or those pertaining to the catering to the troops and the American tourists who visit Bermuda in large numbers during the winter, though the charm of early summer, when Bermuda is handsomest, is now attracting others. The principal crops are early onions and potatoes for the New York market, lily bulbs, and arrowroot for starch.

The government is almost if not the very last survivor of the form common to the early colonies in America, such as that of Virginia and Massachusetts. It is vested in a Governor and two councils, appointed by the Crown, and a House of Assembly chosen by qualified electors for seven years.

The religion of the great majority of the islanders is that of the Church of England or that of the Wesleyan Methodists. There are a few Roman Catholics, and about as many Presbyterians, who claim allegiance to the Free Church of Scotland.

Public education is very inefficient, judged by the standards in the United States, and is confined to lower grades of instruction. There are a few private schools that prepare for college, and do their work well; but the young Bermudian who can do so goes to Canada or to England to complete his education, or failing this, comes to the United States.

The Bermudas had their origin long, long ago, during some vast convulsion of the ocean-floor, when a stream of molten rock spouted upward through a rift, and cooling rapidly as it rose, formed a steep volcanic cone over 15,000 feet in height that rose nearly to the surface. This was covered in the course of geologic time by the shells of the tiny protozoans that fall like a gentle but constant snowstorm from the surface of the ocean as their builders die, and that form a firm foundation for the future island. At last, when the top came near enough to the surface, the floating embryos of corals, mollusks, lime-secreting worms, and plants lodged on it and began a much more rapid deposit of lime-rock material. When the growing masses rose high enough to come within the grasp of the waves, some of them were broken and ground up until at last dry sand beaches lifted their heads above the water, only to be seized upon by the winds and transported over the area until, aided, perhaps, by some elevation of the sea bottom, the whole mass appeared above the wave.

This process of transporting the beach sands by the winds into dunes is going on to-day, and may be seen at the so-called "sand glacier" in Paget parish. The sand in this "glacier" has been moving northeasterly from the beach for the last forty years or more, until it has engulfed a house in its course and obliterated several fields. Of late its course has been retarded and almost arrested by the growth of oleanders, the beach convolvulus (*Ipomea pes capræ*), and a few other plants. As a result the surface is gradually consolidating owing to the action of the carbon dioxide in the rain-water, and becoming rock. Successive showers, charged to some extent with carbonic acid, dissolve a minute portion of the lime, and, percolating through the mass, re-deposit these portions as a cement to bind other grains together. All kinds of curious stratification are to be found in the rocks over the island, evidently resulting from variations in the direction and force of the wind.

This has been called *Æolian formation* by Nelson in his account of the geology of the Bermudas in 1840; and by Dana, in 1875, *Drift sand-rock.*

Extensive caverns exist all over the islands whose floors are now covered by sea-water. These have been produced by the solvent action of the rain-water on the less firmly cemented underlying sands that have been thus washed out into the sea. In ancient geologic time cavern-making must have proceeded on a vast scale, for now the topography of the surface is extensively modified by the "sinks," as the natives call them, which are the depressions left by the falling in of the roofs of caverns grown too large to support the overlying mass.

There is plenty of evidence that the whole of the ellipse, or Greater Bermuda, was for a long time above water. Cedar stumps are often found by divers out on the reefs, and the shells of land snails (*Helices*) have been found in rock now 45 feet under water. One of these snails resembles closely the living form, and another differs mainly in size. Although this evidence points to a comparatively recent subsidence, little, if any, change has taken place during the last 300 years.

Evidence of this is adduced by Prof. Verrill in a recent paper* from the reverse of the ancient seal of the Bermuda Company, engraved on the border of Norwood's map of Bermuda, published in 1626, showing the wreck of a French vessel in 1593 alongside of North Rock. This sketch of the rocks was probably made by Norwood while engaged on his survey in 1617, and shows the rocks very much as they are now. The photograph accompanying this text shows these rocks as they appear to-day, and was taken by a member of the New York University Biological Expedition in 1898. They are the sole remainder of the great land area of Greater Bermuda, and are now nine miles distant from the nearest land. They are 16 to 20 feet high, and stand on a flat platform, just bare at dead-low water. Near the base each rock is worn so as to show a neck, and as time goes on, and this neck becomes smaller, they must be toppled over during some violent storm.

The reefs of Bermuda are commonly, and quite appropriately, called sea-gardens by the Bermudians. They are easily visited, and the coloured fishermen, who spend almost all their lives upon them, know them as well, if not better, than the landsmen know the land. Their boats are equipped with water-glasses, through which one sees to the bottom through thirty feet of water as through a window.

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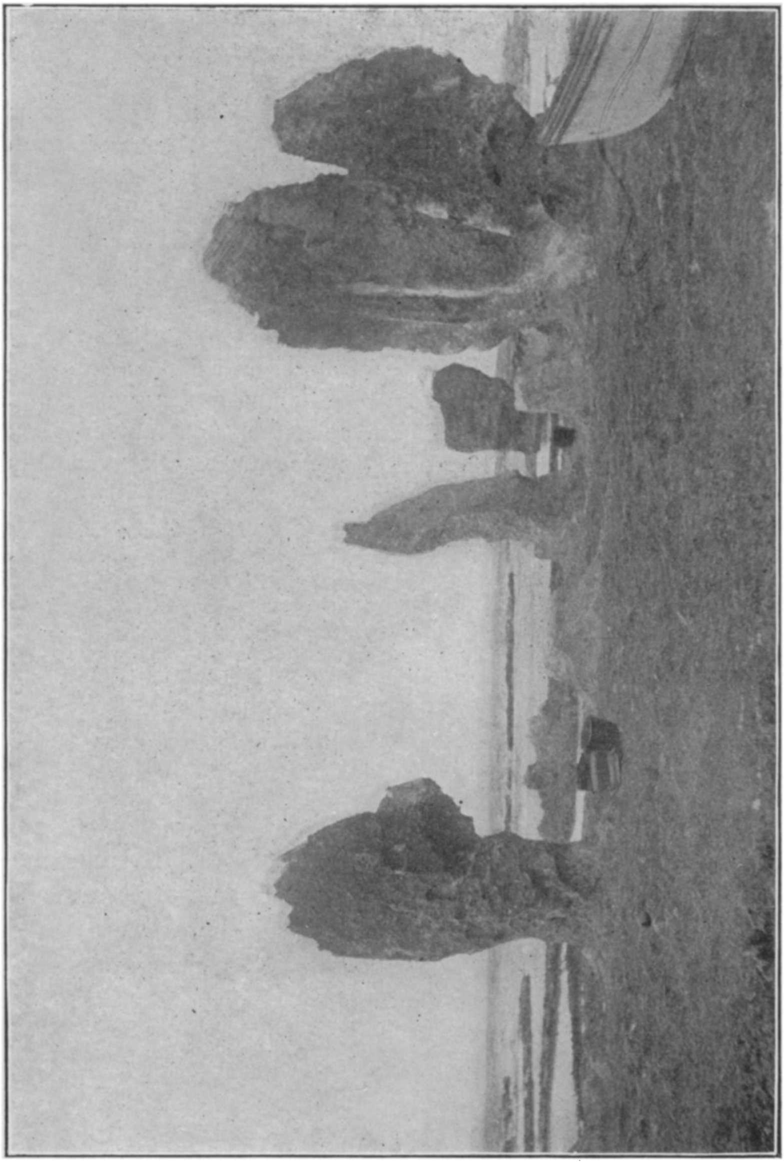
* Notes on the Geology of the Bermudas, Am. Jour. of Sci., Vol. IX, May, 1900.



NORTH ROCK, BERMUDA.

The coral masses are of various colors—some yellow, some chocolate brown, others almost white. Great sea-rods and sea-fans (*Gorgonias*) wave lazily in the tide, and stand out in boldly contrasting colours of purple or brown from among the masses of green and olive sea-weeds. Here and there are clusters of sponges—some bright scarlet, some vivid green, others dull and inconspicuous. Sea-urchins, deep black, with long spines (*Diadema*), or purple and partly covered with dead shells, sea-weed or other flotsam (*Toxopneustes*), stand out like knobs on the rocks. Great sea-puddings, as a holothurian (*Stichopus*) is called, crowd together at the bottom, while in the crannies and on the sides of the rock is a great host of calcareous weeds, mollusks, lime-secreting, tube-building worms, ascidians, hydroids, and beautiful sea-anemones. To the zoölogist these reefs are of intense interest, for here, only a short run from New York by the Quebec Steamship Company's steamers, in a location absolutely free from fevers, and with a climate mild and delightful, he may study tropical marine fauna with ease and pleasure.